

Climate Change: a new paradigm for China's future

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Introduction: Over the last decade and a half, even as the Chinese economy performed extremely well, there has been a spate of commentary in the western literature targeting this performance in terms of its impacts on the environment and later on, the climate. As observed from India over several decades, we can sympathize with the Chinese dilemma of having to short-circuit their growth process because the developed countries have failed to curb their carbon emissions sufficiently or met their commitments in terms of technology and finance to support developing countries in making a transition to a post –carbon future. We are no longer convinced that it is possible to limit the eventual temperature rise to 2⁰C. (Ghotge 2015)¹; the two degree target “has evolved in a somewhat contradictory fashion: policy makers have treated it as a scientific result, scientists as a political issue” (Jaeger and Jaeger 2010)². This means the world as well as the Chinese leadership and people must ready themselves for an increasingly hotter world and all its consequences, since the entire argument of the climate science has consistently been that beyond 2⁰C, the land component of the climate system ceases to be a net absorber of carbon, becoming instead a net emitter of carbon. The dynamic Chinese economy is in a position to make a paradigm shift in its own interest of continuing growth along a sustainable path; this will have to be a political decision by Chinese society. However, the entire world will benefit in terms of climate stabilization if Chinese society arrives at such a decision, provided the rest of the world is able to set aside the petty, short term interests that drive them and serve to divert attention from this critical central task.

We outline below the major contours of the paradigm which can lead to a sustainable long-term path for the Chinese economy, with sufficient flexibility. We also hope that the Chinese leadership and people will arrive at the necessary political decision that will benefit the vast majority of the people of the world. It will be a decision of truly historic magnitude and responsibility.

1.Chinese society has managed two extremely important objectives in the 70 years after the Chinese revolution – production of adequate food grains for feeding the largest population in the world (despite dire predictions of mass hunger by western observers such as Lester Brown

in Washington DC) and becoming the Workshop of the World, the title originally reserved for the UK. In this remarkable transition, it has raised the largest number of people out of poverty in ¼ of the time that the west has taken. This was achieved at a time when environmental and climate concerns had not reached the globally threatening proportions they have now reached. The objective of this discussion is to reflect upon what further needs to be done in order to forestall dire western predictions of a Chinese ecological apocalypse (Richard Smith (2015), Watts (2010)).^{3,4}

1. It is scientifically incorrect and short-sighted to deny the reality of future climate change, as based on the emerging climate science. It is also the opportune moment for Chinese society to change gear i.e. to qualitatively change the direction of economic growth in favour of a pioneering model that will leave the market economies far behind in the 21st century. This qualitative change has to be worked out across all major sectors of the economy: Agriculture, Industry (most importantly including power generation) and Services. This will necessitate a shift from an export oriented economy to one that is largely though not wholly based on domestic demand. China does not need to manufacture for western consumerist markets merely for maintaining high levels of domestic employment. This can as well be achieved through sustainable domestic demand from an increasingly prosperous population. Manufacturing for western markets has created the multiple problems of high emissions, environmental damage, tapping and transporting distant resources in competition with market economies as well as strategic vulnerabilities requiring high defence expenditures diverted from domestic development. It has also led to oil dependency and huge multi-trillion dollar currency reserves which cannot easily be freed for State-led investment in the Chinese economy. A new path can shift many of these trajectories and boost domestic growth rates away from externally imposed constraints via a peaceful transition.

2. The critical power sector can be rapidly shifted away from coal towards pipeline gas from Russia and the FSU states. Hundreds of coal based power plants can be shifted from coal to gas by replacing coal handling plants with gas turbines, while keeping the steam generators and steam turbines intact, to generate power from the hot exhaust gases from the gas turbines. This may save tens if not hundreds of billions of dollars and bring electricity related emissions to less than half the current emissions per unit of electricity. Meanwhile, on a long-term

parallel track, solar and wind deployment can be greatly accelerated as these are the undoubted power sources of the future. Solar PV can be deployed massively in the high altitude desert areas in the west of the country, without major interference with settled population in the eastern part of the country where both major agriculture and urban-industrial development has already taken place. A little appreciated aspect of wind deployment is that future costs of wind power can be significantly lower if the same towers are reused, with replacement only of the wind turbines and blades; this will save not only future tower costs but also land costs, site proving and development costs and transmission connectivity costs. The same logic can also be applied to future solar sites, with first generation solar cells (15-16% efficiency) being replaced by second and third gen PV cells (30-40% efficiency). There will be a similar cost saving. Hence future costs of RE electricity can be significantly lower than present costs, which have themselves dropped drastically in the last few years and will continue to drop⁵. Also, with households using more efficient devices, their consumption expenditure on electricity need not increase to unaffordable levels even as per capita consumption of electricity goes up with rising prosperity. This can be overseen by the same “command –and – control” structure for which China has been much criticized in the past by western observers with dubious motives. If properly managed, this transition can be managed in less than 30 years of steady implementation, say from 2020 to 2050. Judging from the Indian case (WISE 2014) ⁶ where an installed RE capacity of 1.5 - 1.7 million MW can take India on to a sustainable path (30,000 MW of solar installation per year for 30 years, along with 20,000 MW of wind power installation per year for 30 years), the Chinese case would at most be double to triple these numbers, since China has basically completed the major tasks of infrastructure development. In other words, Chinese targets would aim at a total RE installed capacity of 3.5-5.0 million MW to be achieved by 2050 at a rate of 60,000 MW per year of solar installation and 40,000 MW per year of wind power installation, both subject to potential availability of solar and wind resources. We believe it is well within the capability of Chinese economy and society to meet these challenging targets and it is open to Chinese policy makers to examine them. The land requirement based on current technologies would range between 7 - 11 million hectares, compared to the estimated 50 mha for Miscanthus as an energy crop ⁷. Clear long term target setting will help unleash the inbuilt capabilities in the desired direction.

3. China will also have to shift from manufacturing high volume low quality disposable products for consumerist markets in the west to high quality high efficiency long lasting products for the domestic market. The beneficiaries will be the Chinese people who will not waste their incomes on wasteful, unsustainable consumption with consequent environmental problems of waste disposal or waste recycling. The quality of jobs will also be much better than “dirty” jobs recycling wastes generated by other societies.

4. With much of its infrastructure already built, the production of steel and cement can also be reviewed/ reduced. This will bring down emissions, damage due to mining, resource dependency of imports and the need to colonize other sources of critical inputs. System wide improvements of efficiency - materials, energy and water - can result in high levels of production without the dire consequences, which tend to have a cascading effect across the entire system. Weiszacker et al have argued that the same volume of production can be sustained with $\frac{1}{4}$ or $\frac{1}{5}$ the level of inputs ⁸, though at the level of enterprises or entire industrial estates. This challenge needs to be taken seriously.

5. The services sector is being transformed globally by the systematic application of Information Technology (in education, health, banking, insurance, financial services, transportation, logistics, even food delivery). It is evident that the investment and electricity per service sector job is far lower than an industrial job, probably by an order of magnitude. The quality of work is also generally better and more dignified. The western strategy, rarely discussed, has been to promote China as the supplier of manufactured goods and India as the supplier of low cost information services to the market economies. But matters need not follow the western design or convenience. Planning and educational skilling can create millions of value addition jobs in the domestic economy. These jobs will create high economic value with low energy consumption, so that sustainable prosperity is possible.

6. The agriculture sector can shift to an organic basis without loss of productivity and tremendous benefits in terms of health (both human and animal), water pollution, water conservation and environment/ biodiversity conservation. Moreover, agriculture fixes atmospheric CO₂ and agriculture should be suitably incentivized for achieving this national and global good. This will not only retain a section of the population in agriculture and the

villages but also reduce the economic burden of having to create millions of urban jobs and skills. Moreover, rural living is more sustainable than urban lifestyles, especially if Town and Village Enterprise (TVE) jobs can be further modernized, which is enabled by IT.

7. Lastly, the transportation sector based on petroleum fuels can be very significantly switched over to electricity, for which the technology already exists. A simple simulation with actual data ⁶ (vehicle populations and electricity requirements per passenger-km and tonne-km) will show that the total electricity requirement for transportation is less than 5% of the national electricity consumption. This includes all trains, metros, buses, passenger four and two wheelers and light goods carriers by road, but excludes airlines, heavy goods by road and shipping. These latter can be dealt with using hydrogen as fuel, provided the hydrogen is produced from clean sources. Research on hydrogen as fuel has already been initiated in the US over a decade ago. The surprisingly low requirement of electricity in transportation is explained by the fact that electrical vehicles convert vehicle momentum into electricity while braking; thereby conserving energy, unlike IC engine vehicles. Consequently, > 80% of energy is converted into motion whereas the IC engine vehicle is able to convert at most 40% of chemical energy into motion, the rest being wasted. Hence EVs are at least twice as energy efficient as IC vehicles. At a policy level, this means that an additional capacity of 5% to the grid will solve the problems of petroleum import, FE volatility, strategic dependency, urban pollution and health consequences, petroleum refining and risks and climate related emissions in the mid-term. As mentioned earlier, these technologies already exist within China and there is no reason why China cannot further develop /adapt them.

Conclusion: China has the opportunity to confront this historical moment and forge ahead of the market economies by adopting a paradigm shift (Greenpeace 2014) ⁹ for the future. The ultimate decision will have to be political. Yet we do not see the present path being sustainable from an economic, ecological or climate perspective. Systems scientists are in quiet agreement that professional economists lack common sense, which is all the more reason for political resolution.

References:

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